

Welding Symbols

1.0 INTRODUCTION:

Welding cannot take its proper place as an engineering tool unless means are provided for conveying the information from the designer to the workmen. Welding symbols provide the means of placing complete welding information on drawings. The joint is the basis of reference for welding symbols. The reference line of the welding symbol (figure-1) is used to designate the type of weld to be made, its location, dimensions, extent, contour, and other supplementary information. Any welded joint indicated by a symbol will always have an arrow. Accordingly, the terms arrow side, other side, and both sides are used herein to locate the weld with respect to the joint.

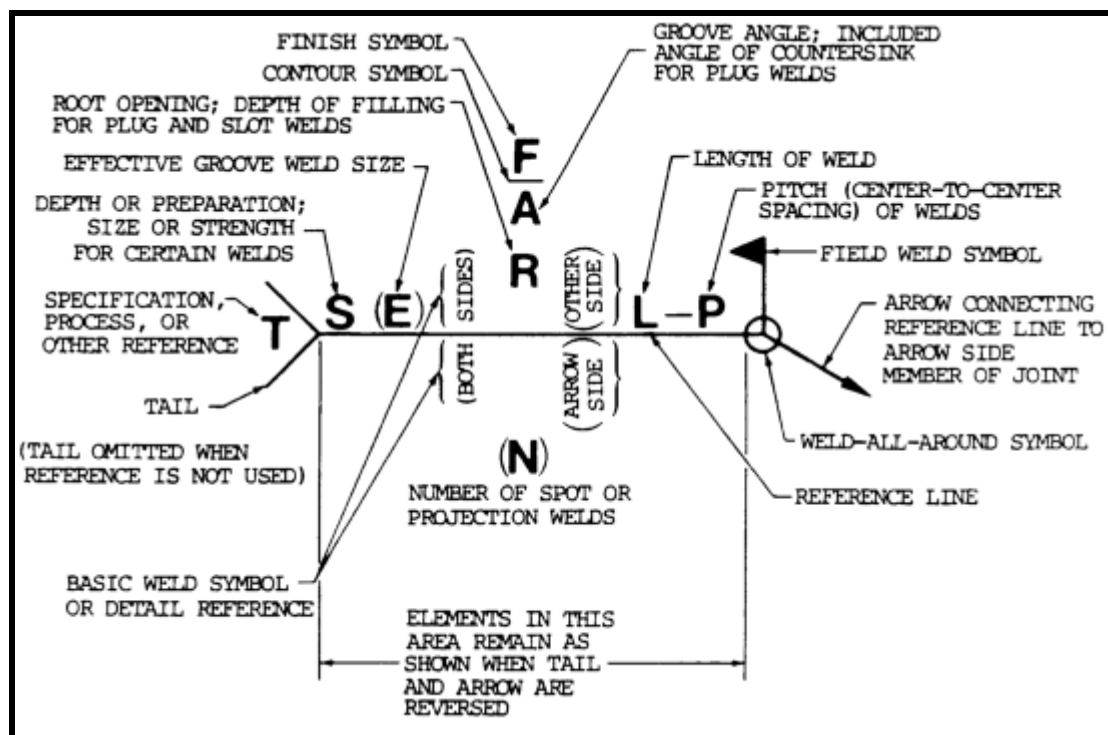


Figure-1: Standard locations of elements in a welding symbol.

The tail of the symbol is used for designating the welding and cutting processes as well as the welding specifications, procedures, or the supplementary information to be used in making the weld. If a welder knows the size and type of weld, he has only part of the information necessary for making the weld. The process, identification of filler metal that is to be used, whether or not peening or root chipping is required, and other pertinent data must be related to the welder. The notation to be placed in the tail of the symbol indicates that

Welding Symbols

these data are to be established by each user. If notations are not used, the tail of the symbol may be omitted.

2.0 WELD SYMBOLS:

A distinction is made between the terms "**Weld symbol**" and "**Welding symbol**". The weld symbol indicates the desired type of weld (figure-2) whereas the welding symbol is a method of representing the weld symbol on drawings (figure-1). Welding symbols are used to indicate the welding processes used in metal joining operations, whether the weld is localized or "all around", whether it is a shop or field weld, and the contour of welds.

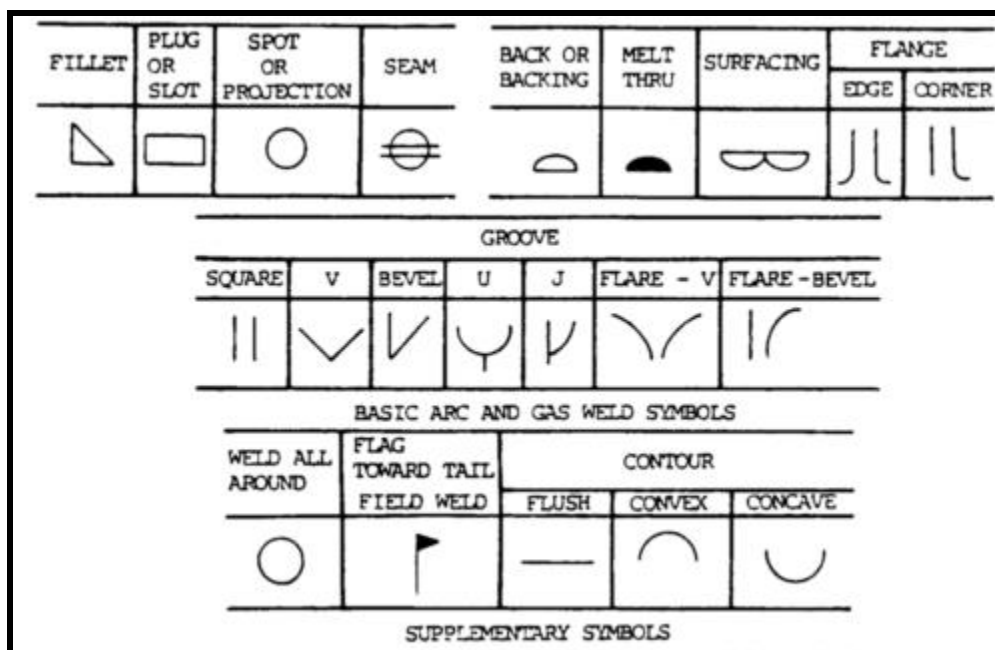


Figure-2: Basic & Supplementary arc and gas weld symbols.

When the mention of a definite process is required, that may be indicated by one or more of the letter designations as shown in Table-1.

3.0 SIGNIFICANCE OF FEW SYMBOLS:

3.1 Significance of arrow – The arrow in a welding symbol determines on which side the welding has to be done. The description of arrow is shown in figure-3.

Table-1: Symbolic designation of few welding & cutting processes.

Welding Symbols

Welding/ Cutting Process	Symbols	Welding/ Cutting Process	Symbols
Air-carbon arc cutting	AAC	Machine welding	ME
Arc cutting	AC	Manual welding	MA
Automatic welding	AU	Oxyacetylene welding	OAW
Carbon arc welding	CAW	Oxygen cutting	OC
Flux cored arc welding	FCAW	Semi-automatic welding	SA
Gas metal arc welding	GMAW	Shielded metal arc welding	SMAW
Gas shielded stud welding	GSSW	Stud welding	SW
Gas tungsten arc welding	GTAW	Submerged arc welding	SAW

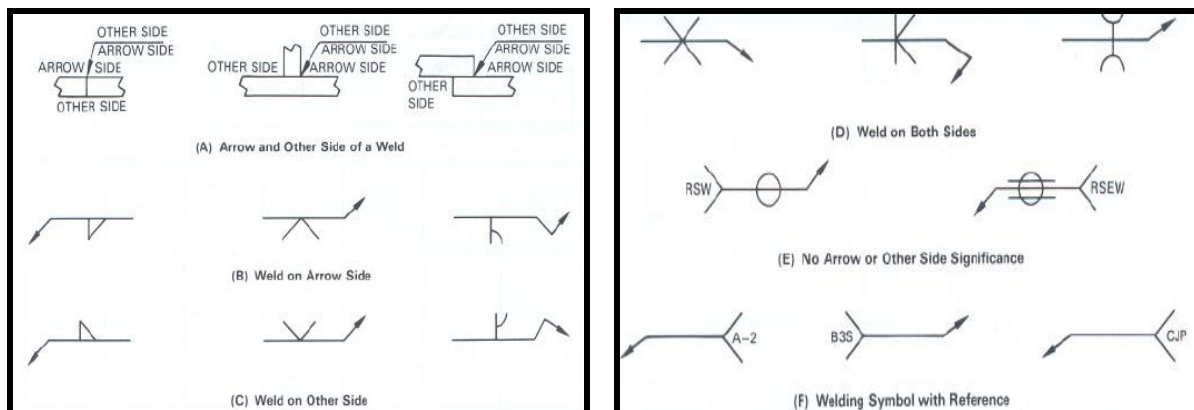


Figure-3: Significance of Arrow, shown in figure (A) to (E).

The complete joint penetration & shape/ contour of the finished weld are shown in figure-4 & figure-5 respectively.

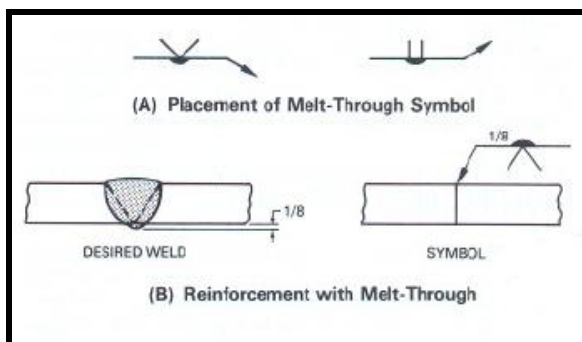


Figure-4: Melt-through welding symbols.

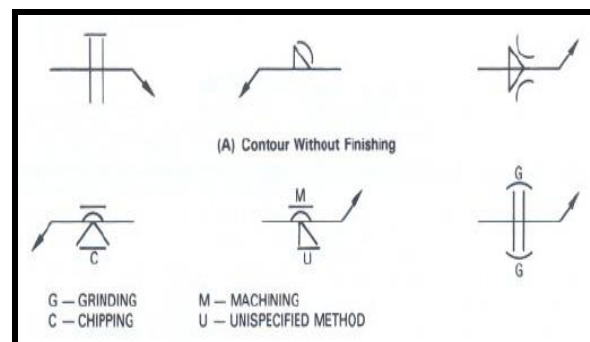


Figure-5: Contour of welding symbols.

3.2 Near side & Other side of welding symbols – For fillet welding these symbols, the arrow connects the welding symbol reference line to one side of the joint and this side shall

Welding Symbols

be considered the arrow side of the joint (figure-6). The side opposite to the arrow side is considered as the other side of the joint (figure-7).

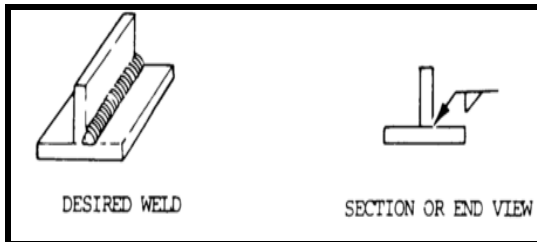


Figure-6: Arrow side fillet welding symbol.

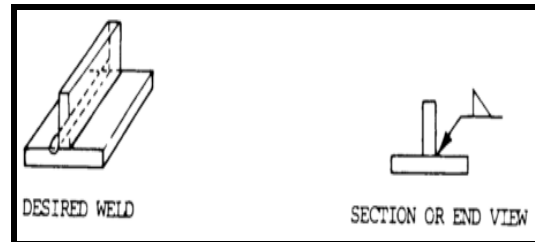


Figure-7: Other side fillet welding symbol.

In case of a butt-weld joint, when a joint is depicted by a single line on the drawing and the arrow of a welding symbol is directed to this line, the arrow side of the joint is considered as the near side of the joint, in accordance with the usual conventions of drafting (figure-8 & 9).

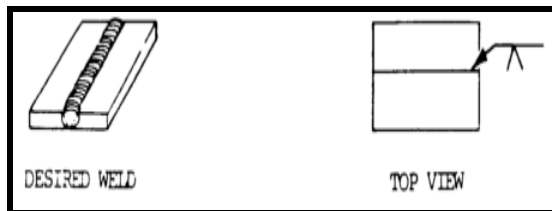


Figure-8: Arrow side V-groove welding symbol.



Figure-9: Other side V-groove welding symbol.

3.3 Single-V and Double-V Groove welds – The size of groove welds shall be shown to the left of the weld symbol (figure-10). When the welds differ in dimensions, both values shall be mentioned as shown in the figure.

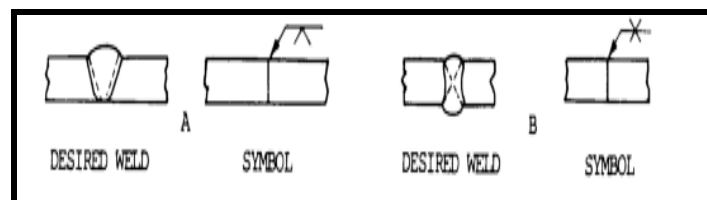


Figure-10: Groove weld for welds extending through the members to be joined.

The symbolic representations of single-V and double-V groove welds are shown in figure-11 & figure-12. The desired weld is also shown in the figures along with the representative symbols.

Welding Symbols

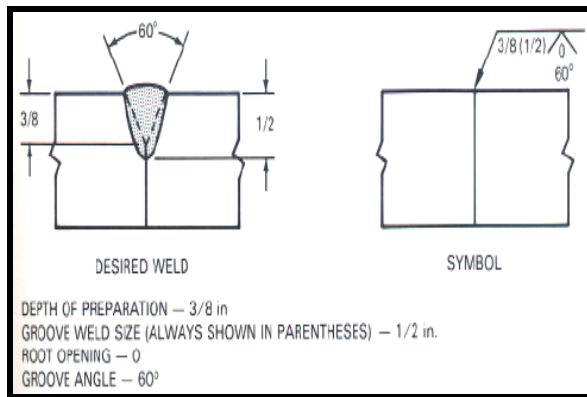


Figure-11: Single V-groove weld.

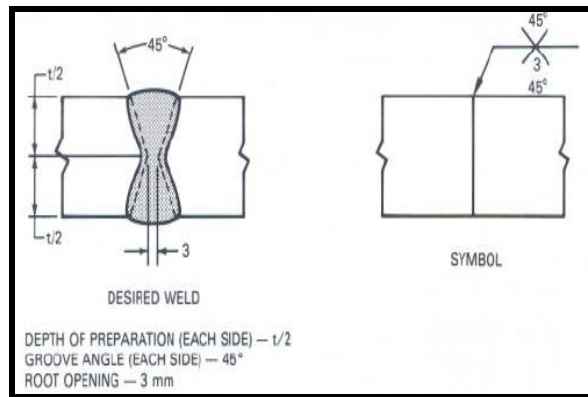


Figure-12: Double V-groove weld.

When the size of groove welds extend partly through the member/ members being joined it is shown on the welding symbol (A and B, figure-13).

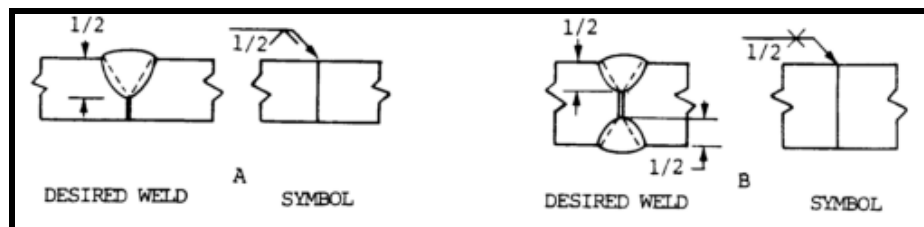


Figure-13: Groove welds dimensions for welds extending partly through the members joined.

3.4 Multiple reference lines – Two or more reference lines may be used with a single arrow to indicate the sequence of operations, as shown in figure-14. The first operation is shown on the reference line nearest to the joint. Subsequent operations are shown sequentially on other reference lines joining the arrow. Reference lines may also be mentioned with data supplementing the welding symbol or to specify the inspection requirements. Multiple reference lines are shown in (A) and application with schematic sketch is shown in (B) of figure-14.

Welding Symbols

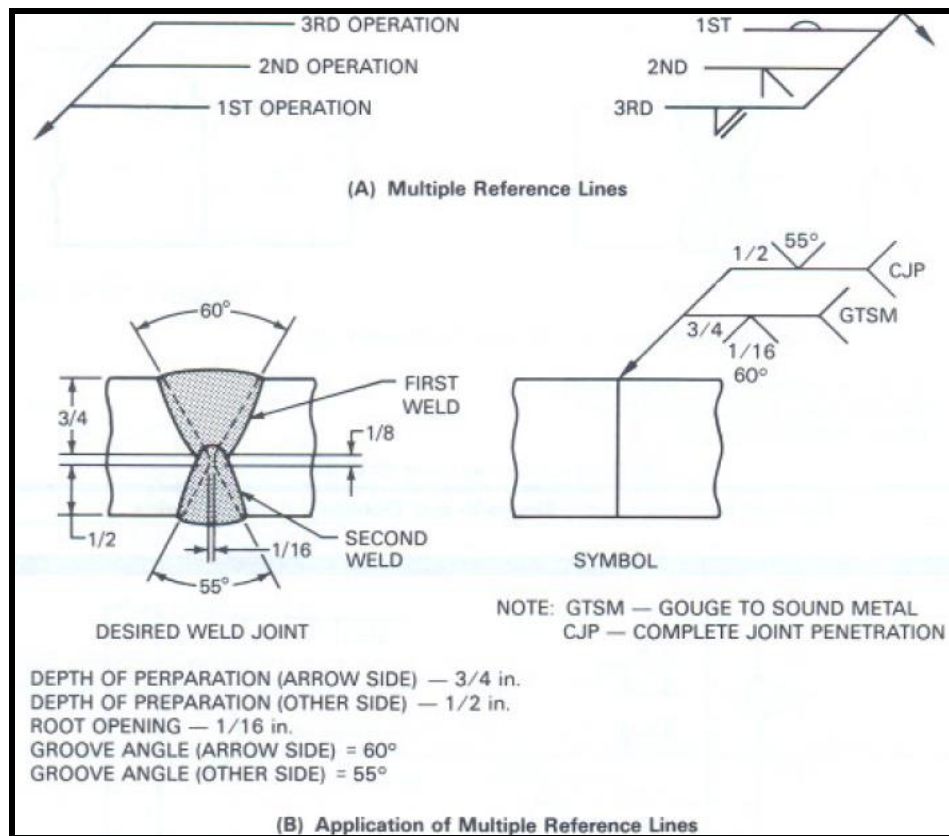


Figure-14: Multiple reference lines & their application in a double-V groove weld.

3.5 Fillet welds – Dimensions of fillet welds shall be shown on the same side of the reference line as the weld symbol (A, figure-15). The size of the weld is shown in left and the length of the weld is placed on the right. 2-6 indicates, length of weld is 2 inch and the gap between two consecutive weld beads (from centre to centre) is 6 inch.

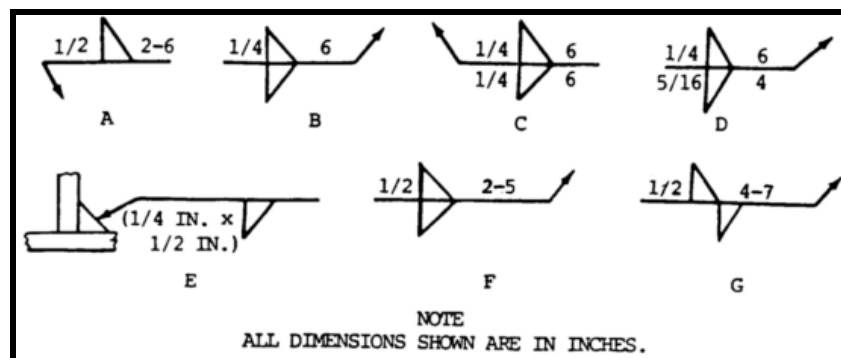


Figure-15: Dimensions of fillet welds.

Welding Symbols

When fillet welds are indicated on both sides of a joint and no general note governing the dimensions of the welds appears on the drawing, the dimensions of both welds may be indicated as shown in the symbol B or C, figure-15.

When the welds differ in dimensions, both must be given as shown by symbol D, figure-15.

The size the fillet weld with unequal legs must be shown in parentheses to left of the weld symbol. Weld orientation is not shown by the symbol and must be shown on the drawing when necessary (E, figure-15).

The weld on both sides with length & pitch is shown in F, figure-15. The length of weld is 2 inch and pitch is 5 inch with fillet leg length of $\frac{1}{2}$ inch.

In a similar way, the increments of staggered welds is shown in G, figure-15.

Examples of fillet weld symbols along with the desired weld are shown in figure-16. In the figure, (A) shows for fillet weld with equal leg length and (B) shows for unequal leg lengths.

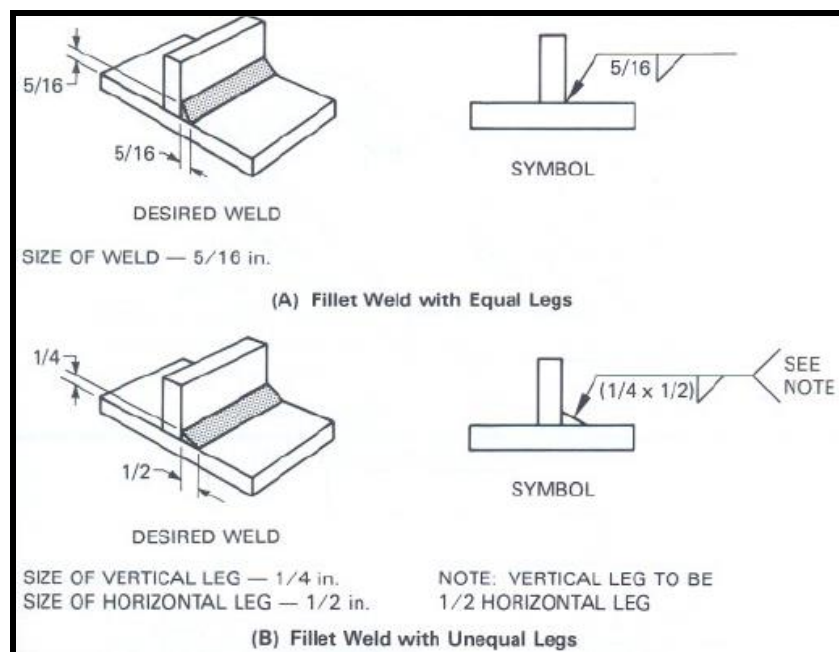


Figure-16: Schematic representations of fillet welds.

Welding Symbols

3.6 Flange welds – A flange weld is made on the edges of two or more members that are usually light gauge sheet metal. For this type of joint, at least one member is required to be flanged by bending it approximately 90 degrees. Example of flange weld is shown in figure-17. In the figure, (A) shows the symbol & weld dimension of edge flange weld and (B) shows the details of corner flange weld.

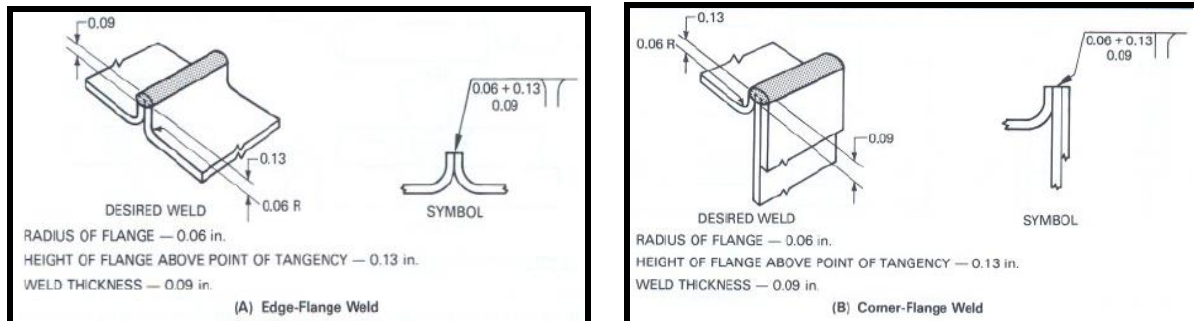


Figure-17: Flange welds.

4.0 GENERAL GUIDELINES:

- ☐ Unless otherwise indicated, the deposited fillet weld size must not be less than the size shown on the drawing.
- ☐ When penetration for a given root opening is specified, the inspection method for determining penetration depth must be included in the applicable specification.
- ☐ When a specification, process, or other reference is used with a welding symbol, the reference is placed in the tail.
- ☐ When use of a definite process is required, the process may be indicated by the letter designations listed in Tables-1.
- ☐ Unless otherwise indicated, all fillet welds are 5/16 in. (0.80 cm) size.
- ☐ Unless otherwise indicated, root openings for all groove welds are 3/16 in. (0.48 cm).

